From Titan's tholins to Titan's aerosols: Isotopic study and chemical evolution at Titan's surface

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Résumé en anglais	In the present work, we focused on the possible isotopic fractionation of carbon during the processes involved in the formation of Titan's tholins. We present the first results obtained on the 12C/13C isotopic ratios measured on Titan's tholins synthesized in laboratory with cold plasma discharges. Measurements of isotopic ratio 12C/13C, done both on tholins and on the initial gas mixture (N2:CH4 (98:2)) used to produce them, do not show any evident deficit or enrichment in 13C relatively to 12C in the synthesized tholins, compared to the initial gas mixture. This observation allows to go further in the analyses of the ACP experiment data, including part of the Cassini–Huygens mission.We also focused on the chemical evolution of the aerosols at Titan surface by studying species coming from acid hydrolysis treatment of Titan's tholins. Preliminary results show a wide diversity of chemical families, going from carboxylic acids to amino acids. Advanced studies could bring at short-term clues on the still unidentified mixture that induces the decrease of the reflectivity as measure by the DISR instrument [Tomasko, M.G., Archinal, B., Becker, T., Bézard, B., Bushroe, M., Combes, M., Cook, D., Coustenis, A., de Bergh, C., Dafoe, L.E., Doose, L., Douté, S., Eibl, A., Engel, S., Gliem, F., Grieger, B., Holso, K., Howington-Kraus, E., Karkoschka, E., Keller, H.U., Kirk, R., Kramm, R., Küppers, M., Lanagan, P., Lellouch, E., Lemmon, M., Lunine, J., McFarlane, E., Moores, J., Prout, G.M., Rizk, B., Rosiek, M., Rueffer, P., Schröder, S.E., Schmitt, B., See, C., Smith, P., Soderblom, L., Thomas, N., West, R. Rain, winds and haze during the Huygens probe's descent to Titan's surface. Nature 438(7069), 765–778, 2005]. At longer-term it could allow to better understand the possible chemical evolution of the Titan's aerosols after falling down at the surface when brought into contact with water.

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